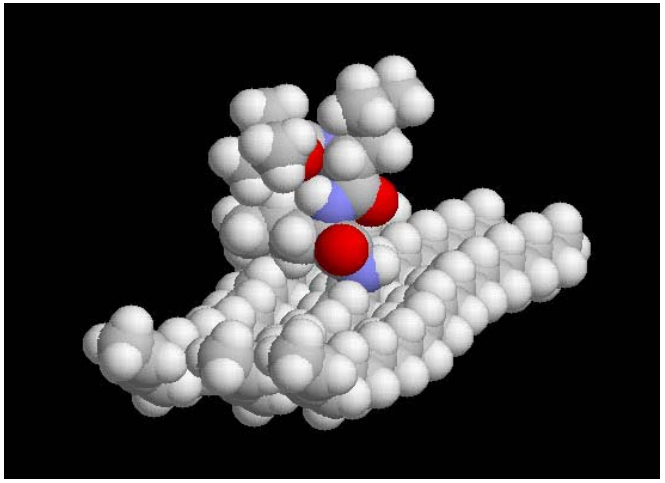
Tailored Polymer Structures via Metathesis Polycondensation Chemistry

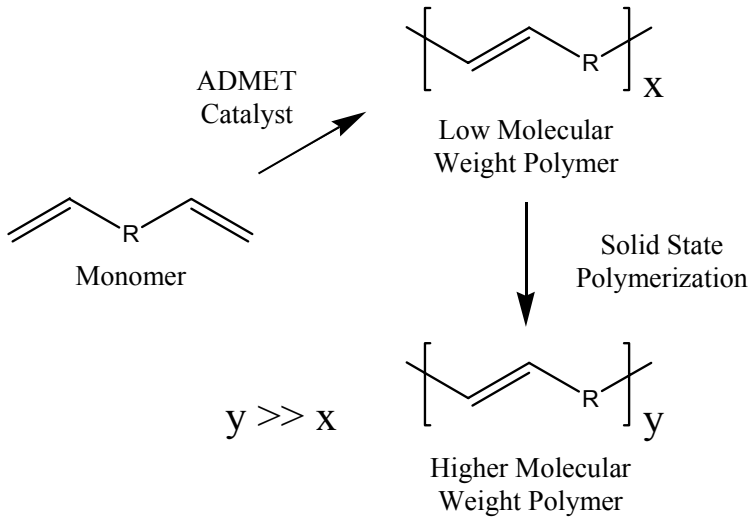
K. B. Wagener, University of Florida – Gainesville

NSF – Division of Materials Research (DMR) Grant Award # 0314110

The ADMET reaction, discovered at the University of Florida several years ago, is one example of polycondensation chemistry, a class of reactions that are used to prepare consumer plastics such as polyester (for beverage bottles) and nylon (for carpet). We have used ADMET chemistry to prepare materials that incorporate of biological entities, such as amino acids and peptides, into polymer backbones. Termed Bio-olefins, these materials may prove useful as bio-degradable polymers, for drug delivery, as membranes and biocompatible coatings, and as chiral separation media. We also are investigating solid state ADMET polymerization, which can be considered a form of green chemistry since no solvents are used. Green chemistry is designed to be less harmful to the environment. Solid state ADMET is can be done at room temperature or even lower, a first for metathesis solid state chemistry.



Bio-Olefin: Peptides standing (covalently bound) on a polyolefin surface.



Well Controlled Polymer Structures Via Metathesis Chemistry

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Accomplishments – Past 12 Months (through August 2003)

The Wagener research group is comprised of 10 graduate students and 4 undergraduates, who during the past 12 months produced 12 refereed publications. Invited lectures included 10 presentations in Japan and Korea, and 5 in the USA.

This research was performed with the help of collaborators from around the globe: Prof. Kimura & Mr. Fugii, and Prof. Masuda at Kyoto University (Kyoto, Japan), Professor Seki at Nagoya University (Nagoya, Japan), and Dr. Kim Chaffin and Dr. Frank Bates at the University of Minnesota.

In addition, interactions with ExxonMobil, and with Materia, Inc, a Caltech startup company, have enabled us to leverage NSF support.

Education: The Goal of The Wagener Research Group.

•Graduated 2 PhDs and 3 undergraduates plus hosted a visiting Ph.D. from the University del Valle, Cali, Colombia.

The Wagener Research Group Summer, 2003